CLEAN: To what extent do US consumers follow techniques for hand sanitation that are associated with favorable food safety outcomes?

Conclusion

Moderate, consistent evidence shows that US consumers do not follow recommended hand sanitation behaviors.

Grade: Moderate

Overall strength of the available supporting evidence: Strong; Moderate; Limited; Expert Opinion Only; Grade not assignable For additional information regarding how to interpret grades,click here.

Evidence Summary Overview

The conclusion regarding consumers' adherence to recommended hand sanitation is derived from five cross-sectional studies all of neutral quality. Studies have consistently shown that proper hand washing associated with food preparation (Abbot et al, 2008; Dharod et al, 2007a; Thumma et al, 2009) and bathroom use (Anderson et al, 2008; Thumma et al, 2009) is far less than optimal and needs to be better promoted (Comer et al, 2009). Two studies involving direct observation of handwashing behaviors during food preparation among college students (Abbot et al, 2008) and Puerto Rican home meal preparers (Dharod et al, 2007a) found a high degree of over-reporting of desirable handwashing behaviors during food preparation. This finding may be explained by a social desirability bias and indicates that results derived from self-reported hand hygiene behaviors should be interpreted with caution.

Evidence Summary Paragraphs

Abbot JM et al, 2008 (neutral quality), a cross-sectional study conducted in New Jersey, observed 153 young adults' handwashing behaviors during food preparation of two recipes and compared their compliance to established guidelines for the prevention and spread of foodborne disease. Mean handwashing knowledge was high at 72%, but young adults were observed performing only 25% of recommended practices. Only 37% knew the most hygienic way to wash hands. Females were more likely than males to wash their hands with soap and water after handling raw poultry (45% vs. 35%).

Anderson et al, 2008 (neutral quality), a cross-sectional, observational study, evaluated 1,400 observations of hand hygiene practices among college students in Texas. Comparison settings included soap and water; soap, water and visual prompts; soap, water and hand sanitizers; and soap, water, hand sanitizers and visual prompts. Overall, 72.9% of students washed their hands, 58.3% used soap or hand sanitizer and 26.1% washed their hands adequately. A significant association was found between gender and handwashing behavior, with more females washing their hand compared with their male peers (76% vs. 57%, $P<0.001$).

Comer et al, 2009 (neutral quality), a cross-sectional, observational and before-and-after study, determined the presence of publications encouraging the public to wash hands in Guilford and Caswell counties in North Carolina, focusing on 299 public restrooms in rest areas, convenience stores, restaurants and childcare facilities, as well as a retroactive assessment of soap and paper towel usage over a three-month period. Of the 299 sites sampled, 78% had a sign stating that it was state law to wash your hands before returning to work, but only 3.7% displayed hand washing publications aimed at the consumer. Soap and paper towel usage in public restrooms was inconclusive in determining the amount of handwashing related to a consumer education communication.

Dharod et al, 2007a (neutral quality), a cross-sectional study, assessed the magnitude of differences between self-reported and observed food safety practices among 60 Puerto Rican women recruited in inner city Hartford, Connecticut. Three home visits were conducted over four days: The first (day one) was delivery of food ingredients for preparation of chicken breast (CB) and salad meal; the second (day three) was household observations; the third (day four4) was a closed-end self-report food safety interview survey. Accuracy of self-report was calculated as follows: (Desirable self-reported food safety behaviors confirmed through direct observation) + (undesirable behaviors observed and then acknowledged through self-report) / total sample. The following behaviors were observed (% subjects): Washed hands with soap and water before meal preparation (25%); washed with soap and water after handling CB and before handling produce (25%). At all stages of preparation, self-reported handwashing with soap and water was greatly over-reported (only 37% accurately reported hand washing practices). Investigators conclude that over-reporting errors must be considered when interpreting data derived from self-reported food safety consumer surveys.

Thumma et al, 2009 (neutral quality), a cross-sectional study conducted in Michigan, evaluated handwashing practices of college students and the association with upper respiratory and gastrointestinal symptoms. A total of 463 male and female students enrolled in the study and 458 reported handwashing practices. Females were more likely than males to wash their hands at least six times per day (36% vs. 19%, P<0.0001) and to always wash their hands after urinating (69% vs. 43%, P<0.0001). However, self-reported frequency of handwashing was not associated with infectious illness symptoms.

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Author, Year, Study Design, Class, Rating	Population / Sample Description and Location	Study Design / I & D Variables / Intervention	Results / Behavioral Outcomes / Significance	Limitations
Abbot JM et al 2008 Study Design: Cross-sectional Study Class: D Rating:	N=153 young adults in New Jersey. Location: United States.	Handwashing behaviors observed during food preparation of two recipes and compared to established guidelines for the prevention and spread of foodborne disease.	Mean handwashing knowledge was high at 72%, but young adults were observed performing only 25% of recommended practices. Only 37% knew the most hygienic way to wash hands. Females were more likely than males to wash their hands with soap and water after handling raw poultry (45% vs. 35%).	Sample was limited to small number of self-selected young adults. Direct observation of participants may have encouraged handwashing.
Anderson et al 2008 Study Design: Cross-sectional, Observational Study	N=1,400 observations of hand hygiene practices among college	Comparison settings included: • Soap and water • Soap, water and visual prompts	Overall, 72.9% of students washed their hands, 58.3% used soap or hand sanitizer and 26.1% washed their hands adequately.	Inclusion/exclusion criteria were not described. Six of the seven observers were females, resulting in

Class: D Rating:	students in Texas. Location: United States.	• Soap, water and hand sanitizers • Soap, water, hand sanitizers and visual prompts.	A significant association was found between gender and handwashing behavior, with more females washing their hand compared with their male peers (76% vs. 57%, P<0.001).	skewed gender observations. Although the observers made efforts to be obscure, their presence may have influenced student hand hygiene practices.
Comer et al 2009 Study Design: Cross-sectional, Observational, Before-and-After Study Class: D Rating:	N=299 public restrooms in rest areas, convenience stores, restaurants and childcare facilities in Guilford and Caswell counties in North Carolina. Location: United States.	Determined presence of publications encouraging the public to wash hands and retroactive assessment of soap and paper towel usage over a three-month period.	Of the 299 sites sampled, 78% had a sign stating that it was state law to wash your hands before returning to work, but only 3.7% displayed handwashing publications aimed at the consumer. Soap and paper towel usage in public restrooms was inconclusive in determining the amount of handwashing related to a consumer education communication.	Minimalist study protocol and statistical analysis with no comparison to goals or expected outcomes.
Dharod JM, Perez-Escamilla R et al, 2007a Study Design: Cross-sectional study Class: D Rating:	N=60 Puerto Rican women recruited from inner city Hartford, CN. Mean age: 40 years. 60% spoke only Spanish at home; 55% had less than high school education; 85% unemployed; 56.7% had monthly income of	**Study design:** • Microbial testing • Household observation • Self-report interview survey. **Dependent variables:** • Thawing method • Use and sanitation of cutting boards and knives • Handwashing habits	At all stages of preparation, self-reported handwashing with soap and water was greatly over-reported (only 37% accurately reported handwashing practices). Observation (% subjects): Washed hands with soap and water before meal preparation (25%); washed with soap and water after handling CB, before handling produce (25%).	A convenient sample used; observation could influence practice. No description provided for the validation of the interview survey used.

	<$1,000.	• Washing of produce • Method of checking chicken doneness. **Independent variables:** • Education • Age • Language • Monthly income • Received food safety education • Importance of food safety.		
Thumma J, Aiello AE et al, 2009 Study Design: Cross-sectional study Class: D Rating:	N=463 male and female students in Michigan enrolled in study and N=458 reported handwashing practices. Location: United States.	Handwashing practices of college students and the association with upper respiratory and gastrointestinal symptoms.	Females were more likely than males to wash their hands at least six times per day (36% vs. 19%, P<0.0001) and to always wash their hands after urinating (69% vs. 43%, P<0.0001); however, self-reported frequency of handwashing was not associated with infectious illness symptoms.	Illness and handwashing practices based on self-report. Questionnaire was not shown to be valid or reliable.

Research Design and Implementation Rating Summary
For a summary of the Research Design and Implementation Rating results, click here.

Worksheets

Abbot JM, Byrd-Bredbenner C, Wheatley V, Cottone E, Clancy M. Observed hand washing behaviors of young adults during food preparation. *Food Protection Trends* 2008; 28(11):912-916.

Anderson JL, Warren CA, Perez E, Louis RI, Phillips S, Wheeler J, Cole M, Misra R. Gender and ethnic differences in hand hygiene practices among college students. *Am J Infect Control.* 2008;36:361-368.

Comer MM, Ibrahim M, McMillan VJ, Baker GG, Patterson SG. Reducing the spread of infectious disease through hand washing. *J of Extension.* 2009 Feb; 47(1):1-8.

Dharod JM, Pérez-Escamilla R, Paciello S, Bermúdez-Millán A, Venkitanarayanan K, Damio G. Comparison between self-reported and observed food handling behaviors among Latinas. *J Food Prot.* 2007; 70: 1,927-1,932.

Thumma J, Aiello AE, Foxman B. The association between handwashing practices and illness symptoms among college students living in a university dormitory. *Am J Infect Control.* 2009 Feb; 37 (1): 70-72. Epub 2008 Oct 3.